What is claimed is:

1. A method for mitigating multipath in a positioning system range measurement, the method comprising:

a) transmitting a plurality of synchronous unique positioning signals from a plurality of antenna elements in known locations;

b) receiving said plurality of synchronous unique positioning signals at an observing receiver;

c) determining which of said plurality of synchronous unique positioning signals received in step b) exhibit substantially equal geometric ranges and unit vectors with respect to said observing receiver;

d) interpreting signals determined in step c) to calculate optimal said range measurement.

2. The method of claim 1, wherein said interpreting signals in step d) includes the selection of substantially coherent said plurality of synchronous unique positioning signals.

3. The method of claim 1, wherein said interpreting signals in step d) includes the determination of a best-fit estimate of said plurality of synchronous unique positioning signals.

4. The method of claim 1 wherein said interpreting signals in step d) includes the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

5. The method of claim 1, wherein said interpreting signals in step d) includes two or more techniques selected from the group consisting of:

(i) the selection of substantially coherent said plurality of synchronous unique positioning signals,

(ii) the determination of a best-fit estimate of said plurality of synchronous unique positioning signals, and

(iii) the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

6. A system for mitigating multipath in a positioning system range measurement, the system comprising:

a) means for transmitting a plurality of synchronous unique positioning signals from a plurality of antenna elements in known locations;

b) means for receiving said plurality of synchronous unique positioning signals at an observing receiver;

c) means for determining which of said plurality of synchronous unique positioning signals received in step b) exhibit substantially equal geometric ranges and unit vectors with respect to said observing receiver;

e) means for interpreting signals determined in step c) to calculate optimal said range measurement.

7. The system of claim 6, further incorporating means configured to select substantially coherent said plurality of synchronous unique positioning signals.

8. The system of claim 6, further incorporating means configured to determine a best-fit estimate of said plurality of synchronous unique positioning signals.

9. The system of claim 6, further incorporating means configured to determine the mean range measurement of said plurality of synchronous unique positioning signals.

10. The system of claim 6, further incorporating means configured to process, in combination, two or more techniques selected from the group consisting of:

(i) the selection of substantially coherent said plurality of synchronous unique positioning signals,

(ii) the determination of a best-fit estimate of said plurality of synchronous unique positioning signals, and

(iii) the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

11. A method of mitigating multipath in an observing receiver position solution, the method comprising:

a) transmitting a plurality of synchronous unique positioning signals from a plurality of antenna elements in known locations;

b) receiving said plurality of synchronous unique positioning signals at said observing receiver;

c) determining which of said plurality of synchronous unique positioning signals received in step b) exhibit substantially equal geometric ranges and unit vectors with respect to said observing receiver;

d) interpreting signals determined in step c) to calculate optimal range measurements;

e) processing said optimal range measurements to determine said position solution.

12. The method of claim 11, wherein said interpreting signals in step d) includes the selection of substantially coherent said plurality of synchronous unique positioning signals.

13. The method of claim 11, wherein said interpreting signals in step d) includes the determination of a best-fit estimate of said plurality of synchronous unique positioning signals.

14. The method of claim 11, wherein said interpreting signals in step d) includes the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

15. The method of claim 11, wherein said interpreting signals in step d) includes two or more techniques selected from the group consisting of:

(i) the selection of substantially coherent said plurality of synchronous unique positioning signals,

(ii) the determination of a best-fit estimate of said plurality of synchronous unique positioning signals, and

(iii) the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

16. The method of claim 11, wherein said processing in step e) includes a receiver autonomous integrity monitoring algorithm.

17. The method of claim 11, wherein said processing in step e) includes a Kalman filter or other best-fit positioning algorithm.

18. A method for mitigating multipath in a positioning system range measurement, the method comprising:

a) transmitting a plurality of synchronous unique positioning signals from a plurality of transmit antenna elements in known locations;

b) receiving said plurality of synchronous unique positioning signals at an observing receiver via a plurality of receive antenna elements which exhibit substantially equal geometric ranges and unit vectors with respect to said plurality of transmit antenna elements ;

c) interpreting signals received in step b) to calculate optimal said range measurement.

19. The method of claim 18, wherein said interpreting signals in step c) includes the selection of substantially coherent said plurality of synchronous unique positioning signals.

20. The method of claim 18, wherein said interpreting signals in step c) includes the determination of a best-fit estimate of said plurality of synchronous unique positioning signals.

21. The method of claim 18, wherein said interpreting signals in step c) includes the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

22. The method of claim 18, wherein said interpreting signals in step c) includes two or more techniques selected from the group consisting of:

(i) the selection of substantially coherent said plurality of synchronous unique positioning signals,

(ii) the determination of a best-fit estimate of said plurality of synchronous unique positioning signals, and

(iii) the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

23. A method of mitigating multipath in an observing receiver position solution, the method comprising:

a) transmitting a plurality of synchronous unique positioning signals from a plurality of transmit antenna elements in known locations;

b) receiving said plurality of synchronous unique positioning signals at an observing receiver via a plurality of receive antenna elements which exhibit substantially equal geometric ranges and unit vectors with respect to said plurality of transmit antenna elements ;

c) interpreting signals received in step b) to calculate optimal said range measurement.

d) processing said optimal range measurements to determine said position solution.

24. The method of claim 23, wherein said interpreting signals in step c) includes the selection of substantially coherent said plurality of synchronous unique positioning signals.

25. The method of claim 23, wherein said interpreting signals in step c) includes the determination of a best-fit estimate of said plurality of synchronous unique positioning signals.

26. The method of claim 23, wherein said interpreting signals in step c) includes the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

27. The method of claim 23, wherein said interpreting signals in step c) includes two or more techniques selected from the group consisting of:

(i) the selection of substantially coherent said plurality of synchronous unique positioning signals,

(ii) the determination of a best-fit estimate of said plurality of synchronous unique positioning signals, and

(iii) the determination of the mean range measurement of said plurality of synchronous unique positioning signals.

28. The method of claim 23, wherein said processing in step d) includes a receiver autonomous integrity monitoring algorithm.

29. The method of claim 23, wherein said processing in step d) includes a Kalman filter or other best-fit positioning algorithm.